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THE TREATMENT OF LICHENS IN "THE GENERA OF FUNGI."

BRUCE FINK.

Dr. Clements' volume "The Genera of Fungi"[1] is well known to mycologists, but little has been stated regarding the treatment of lichens in this work. Though few botanists favor the distribution of lichens made by Dr. Clements, excluding the class *Lichenes*, this disposition is the only one that seems consistent with the principles of classification. While this is true, the present writer finds a number of particulars in which the lichens seem to him at least to have fared badly. He confesses being startled at the large number of new genera proposed in a disposition of lichens which, though original in some respects, is nevertheless mainly based upon the work of another man. Extensive genus or species making among lichens should rest upon great knowledge of these plants, which cannot be acquired in a few years. The systematic work of Nylander, Müller, and others during the last half century makes the acquisition of a good knowledge of lichen genera and species one fraught with an amount of labor which is fully appreciated only after many years of study of these plants, and the literature pertaining to them.

Most of Dr. Clements' new genera appear good enough, but who knows that they have not appeared previously under some other name, or who would dare to pass upon them without such exhaustive study as no man can make, covering the whole range of lichen genera? Making a large number of new genera, without apparent possibility of adequate first hand knowledge of all of the plants or the extensive literature involved' appears to be a procedure of doubtful merit. Seeing the need of new genera is by no means sufficient reason for making them. We are not told of more than one species for any of the sixty and more new genera, and in three instances, viz. tne genera *Phaeoglaena*, *Dipyrgis* and *Ocellis*, the writer has not been able to discover even a type species. Examination of the work of Dr. Zahlbruckner, in Engler and Prantl, disclosed the fact that the diagnostic characters there given furnish the basis for the three genera named above, but the making of new genera on this basis appears like a merely literary performance, even if genera without cited species are valid, which is questionable.

Each new genus rests upon two or three diagnostic words found in the list of new genera and whatever one may find of diagnostic value in the portion of the keys where the new genus is proposed. This treatment will stand the test of validity, but it is so brief and uncertain that one can hardly regard it satisfactory. Several new genera are placed under the *Lecideaceae* on page 77 and under the *Peltophoraceae* on page 174. The omission of the former family on the latter page is of course an oversight.

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[1] Clements, F. E. The Genera of Fungi. 1-227. Minneapolis. The H. W. Wilson Company, 1909.

While holding the opinion that the lichen is a fungus, Dr. Clements seems to have based the genera *Chloropeltis*, *Cyanobaeis* and *Cystolobis* upon characters of the algae in relationship with which the lichens involved grow. This appears hardly consistent, since he points out no morphological differentiation of each genus due to the host. *Chloropeltis* replaces *Peltidea* without any explanation, and whatever name is used, the genus should rest upon the peculiarities in development of the apothecium as worked out by Fünfstück, not upon the algae.

Changes in form of names of lichen genera, fortunately are not numerous. *Peltigera* is changed to *Peltophora* and *Peltigeraceae* to *Peltophoraceae* for reasons that are not stated, but which may appear in a careful study of the origin of the names. The *on* endings are all changed to *um*, which is better form, though there is doubt whether the change from the original form is warranted. *Theloschistes* is retained, though the original *Teloschistes* is correct and expresses exactly a diagnostic character of the genus not expressed by *Theloschistes*, which has a quite different meaning.

The writer can not pass minutely upon the merits of the portions of the keys dealing with lichens, for he has had no occasion to put them to severe test himself or in the hands of students. However, in the nature of the case, being based upon the recent work of Dr. Zahlbruckner, they should be better than portions based upon Saccardo. In general they appear good with such examination as could be made by running through them somewhat carefully.

The expression "parasitic on algae" is commonly used in the keys and is misleading in a number of ways. Dr. Clements gives no definition of the term "parasitic" in the glossary. In his Plant Physiology and Ecology,"[2] page 104, we find the following:—"The type of parasitism in which the presence of the parasite benefits the host-plant in some measure is commonly distinguished as symbiosis or mutualism." This view of both parasitism and symbiosis is unusual, but admits of his use of the expression, "parasitic on algae." Nowhere in the keys does one get any adequate statement of the relationship of the lichen to a substratum, and this omis-

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[1] Fünfstück, Moritz. Beiträge zur Entwickelungsgeschichte der Lichenen. 1—20. pl. 3 and 4. Berlin. Gebrüder Borntraeger, 1884. Reprint from Jahrb. K. Bot. Gart. u. Bot. Mus. Berlin. 3: 1884.

[2] Clements, F. E. Plant Physiology and Ecology. I-XV. 1-315 f. 1-125. New York. Henry Holt and Company, 1907.

sion, with the constant statement of the relationship with an alga, will surely mislead the student. It would be much less obscure and therefore more satisfactory for the purpose of the keys to state that the algal cells or filaments are found growing within the thallus, especially since the lichen is parasitic about rather than "on" the algae, and at the same time bears a relationship to some external substratum.

Thallus is defined as "a more or less definite mass of hyphae parasitic on algae." This new definition of thallus is surprising and confusing, and the author further complicates matters by neither following his own definition nor his view that the lichen is a fungus in all parts of the keys. For instance he states that the thallus in the *Collemaceae* is "more or less distinctly gelatinous" when it is, mainly at least, the alga on which the lichen grows that is gelatinous, though portions of the lichen may be slightly gelatinized. The thallus of *Ephebe* is said to be "dwarf fruticose, much branched, dark," when it is the alga on which the lichen grows that should be thus described. Foot notes, explaining why the conventional form of description was followed, would have helped at these points. There are other similar errors which will be found easily. However, Dr. Clements has done as well as others, for of a large number of authors who have recently written regarding the lichen thallus, careful examination scarcely shows a single one who is consistent with whatever view of the nature of the lichens he attempted to follow. When we get far enough away from erroneous tradition regarding lichens we may be able to be consistent.

Under *Graphidaceae*, page 58, we find the statement: "Mycelium parasitic on yellow-green algae, forming a * * * * thallus * * * * or thallus lacking and parasitic on lichens or on bark." There is no indication of any relationship with bark in those species in which algae are found in the thallus, and the student will be misled unless a competent teacher be at hand. Doubtless there is no intention of saying that the thallus is parasitic instead of saprophytic on bark, yet the language quoted would imply that. Again on page 70, we find the following: "Mycelium inconspicuous and saprophytic, or parasitic on algae," a statement which would lead the student to conclude that the saprophytic condition does not exist when the fungus grows in relationship with the alga.

The limitation of lichen families is a matter in which there is great diversity of opinion. It would seem that Dr. Clements has been influenced, in the recognition of a few large families, by a desire to keep the lichens together as much as could be consistently done, while distributing them among fungi to the exclusion of the class *Lichenes*. The *Graphidaceae* are made to include subdivisions containing in the aggregate about 2000 described species. He credits all of these with possessing a perithecium and states that in the *Arthoniae* the perithecium is without an exciple. It may be doubted whether any of the fruits in the *Graphidaceae* should be called perithecia, and a perithecium without an exciple is scarcely a perithecium at all. It is by no means certain what should be done with *Chiodecton*- and *Dirina*-like plants, but it appears to the writer that *Arthonia*-like plants might better be separated on the basis of fruit-character. Lack of space forbids adequate discussion of family limitations in the *Parmeliaceae* and *Physciaceae*, but it seems that the *Teloschistaceae* and the *Caloplacaceae* with their characteristic chemical relations and spore structure might better be kept separate from the *Physciaceae*.

It has been impossible thus far for most lichenists, and other botanists as well, to relieve themselves of tradition sufficiently to see that the dual-hypothesis theory and the consortism theory of lichens are alike untenable, and of the few who have concluded that the lichen is after all a fungus pure and simple only two, Dr. C. E. Bessey[1] and Dr. Clements, have attempted to devise ways of distributing the lichens to the exclusion of the class *Lichenes*. Bare distribution without statement of reasons why lichens should be thus distributed is not very convincing to botanists who think that these plants should still be retained in a distinct group, but the writer is convinced that anyone who goes very deeply into the study of lichens, at the same time freeing himself as much as possible from the influence of tradition, must finally conclude that the distribution of lichens in some such manner as that proposed by Dr. Clements is the only proper treatment of those plants and that the only question that remains is the manner of distribution. We can not hope for a very satisfactory solution until further studies of *Ascomycetes* gives us a more thorough knowledge of the relationships of these plants, but Dr. Clements' treatment furnishes a working basis and appears to be better than retaining the artificial group *Lichenes*. In this lies the great value of Dr. Clements' work so far as the lichens are concerned.

Another commendable feature of the work is the application of the terminology of mycology to lichens. Since the close relationship of these plants to other fungi seems apparent, much of the antiquated and objectionable terminology of lichenology may well be dispensed with. The excellent glossary and the comparatively complete index of genera of fungi are in themselves very helpful.

It will readily be seen that much of the matter which the writer finds objectionable will not interfere with the use of the keys, which seem to be workable in spite of the faults pointed out. We trust that a revision may appear in due time, which will obviate certain faults and add considerably to the value of the work. In the meantime, the volume will be found helpful to those who work on lichens or other fungi.

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[1] Bessey, C. E. A Synopsis of Plant Phyla. University of Nebraska Studies 74. 1-99. 1907.